Question

①
$$y = \cos x + \frac{2}{x^3}$$

$$\to y = \cos x + 2x^{-3}$$

$$\frac{dy}{dx} = \frac{d\cos x}{dx} + 2\frac{dx^{-3}}{dx}$$

$$= -\sin x + 2\left(-3x^{-3-1}\right)$$

$$= -\sin x - 6x^{-4}$$

②
$$y = 2x(1-x^2)$$

$$\frac{dy}{dx} = ??$$

$$y = 2x \times (1-x^2)$$

$$y = 2x - 2x^3$$

$$\frac{dy}{dx} = 2\frac{dx}{dx} - 2\frac{dx^3}{dx}$$

$$= 2 - 2(3x^2)$$

$$= 2 - 6x^2$$

③ $y = \left(\sqrt{x} + \dfrac{1}{\sqrt{x}}\right)^2$

H/W

↳ diff^n

1st simplify it

$\boxed{(a+b)^2 = a^2 + b^2 + 2ab}$ ✓

$y = \left(\sqrt{x} + \dfrac{1}{\sqrt{x}}\right)^2$

$= x + 2 \times \sqrt{x} \times \dfrac{1}{\sqrt{x}} + \dfrac{1}{x}$

$\boxed{\dfrac{1}{x} \sim x^{-1}}$

$y = x + 2 + \dfrac{1}{x}$

$\dfrac{dy}{dx} = 1 + 0 + \dfrac{d\left(\frac{1}{x}\right)}{dx}$

$= 1 - \dfrac{1}{x^2}$

(4)

$$y = \frac{x+1}{x-1} \Leftarrow \frac{u}{v}$$

$$\frac{dx}{dx} = 1$$

$$\frac{d1}{dx} = 0$$

$$\longrightarrow y = \frac{x+1}{x-1}$$

$$\text{H/}\omega \quad \frac{dy}{dx} = \frac{(x-1)\frac{d(x+1)}{dx} - (x+1)\frac{d(x-1)}{dx}}{(x-1)^2} = \frac{(x-1)\times 1 - (x+1)\times 1}{(x-1)^2}$$

$$= \frac{x-1-x-1}{(x-1)2} = \frac{-2}{(x-1)^2}$$

(5)

$y = x^2 - 4x + 3$, then find value of $\dfrac{dy}{dx}$ at $x = 2$

$$y = x^2 - 4x + 3$$

$$\frac{dy}{dx} = 2x - 4(1) + 0$$

$$\boxed{\frac{dy}{dx} = 2x - 4}$$

$$\left(\frac{dy}{dx}\right)_{x=2} = 2 \times 2 - 4 = 0$$

Question

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$y = \dfrac{A}{x^6} - \dfrac{B}{x^5}$; then find $\underline{x}$ where $\boxed{\dfrac{dy}{dx} = 0}$

Condition

H/w

$$y = \dfrac{A}{x^6} - \dfrac{B}{x^5}$$

$$\dfrac{dy}{dx} = A \dfrac{dx^{-6}}{dx} - B \dfrac{dx^{-5}}{dx}$$

$$\dfrac{dy}{dx} = -6A\,x^{-7} + 5B\,x^{-6}$$

$$\dfrac{dy}{dx} = -\dfrac{6A}{x^7} + \dfrac{5B}{x^6}$$

$$\dfrac{-6A}{x^7} + \dfrac{5B}{x^6} = 0$$

$$\dfrac{5B}{x^6} = \dfrac{6A}{x^7 x}$$

$$\boxed{x = \dfrac{6A}{5B}} \; \text{Ans}$$

⑦ Position of object $\boxed{x = 4t^3 + 2(t^2) - 7t + 9}$ then find

velocity $\left(V = \dfrac{dx}{dt}\right)$ at $t = 2\,sec$

H/W

$\xrightarrow{\hspace{1cm}}$ S^n ⑦ $\dfrac{dx}{dt} = 4(3t^2) + 2(2t) - 7 \times 1$

$V = \dfrac{dx}{dt}$

$\boxed{V = 12t^2 + 4t - 7}$

$\dfrac{dx}{dt} = V = 12(2)^2 + 4 \times 2 - 7$

$= (48 + 8 - 7)$

⑧ $y = 4x^3 + 2x^2 - 7x + 9$

$\dfrac{dy}{dx} = 4(3x^2) + 2(2x) - 7(1) + 0$

⑨ $y = \boxed{\tan x \cdot \cos^2 x} = \dfrac{\sin x}{\cos x} \times \cos^2 x \, (\cos x = \sin x \cdot \cos x$

$\downarrow$ $y = \sin x \cdot \cos x$

$\dfrac{dy}{dx} = \dfrac{d\sin x}{dx}\cos x + \dfrac{d\cos x}{dx}\sin x = \cos^2 x - \sin^2 x$

(10) $y = \cos x$ find $\left(\dfrac{dy}{dx}\right)$ at $x = \pi/6$

H/W

$\dfrac{dy}{dx} = -\sin x \implies \left(\dfrac{dy}{dx}\right)_{x=\pi/6} = -\sin(\pi/6) = -\dfrac{1}{2}$

(11) $y = \dfrac{4}{(x^2-4)} \implies$ <u>division (Rule)</u>

$\dfrac{dy}{dx} = \dfrac{(x^2-4)\dfrac{d4}{dx} - 4\dfrac{d(x^2-4)}{dx}}{(x^2-4)^2}$

$= \dfrac{0 - 4(2x-0)}{(x^2-4)^2} = \dfrac{-8x}{(x^2-4)^2}$ Ans.

(12) $y = \sqrt{x} + \dfrac{1}{\sqrt{x}}$

$y = x^{1/2} + x^{-1/2}$

$\dfrac{dy}{dx} = \dfrac{1}{2}x^{\frac{1}{2}-1} - \dfrac{1}{2}x^{-\frac{1}{2}-1} = \dfrac{1}{2}x^{-\frac{1}{2}} - \dfrac{1}{2}x^{-3/2}$ Ans.

(13) $y = e^x \times \log x$

$$y = \frac{de^x}{dx} \times \log x + e^x \frac{d \log x}{dx}$$

$$= e^x \log x + \frac{e^x}{x}$$

$$= e^x \left(\log x + \frac{1}{x} \right)$$

(14) $y = \log x \times \sin x$

H/W

$$\boxed{\frac{dy}{dx} = \frac{1}{x} \sin x + \log x \cos x}$$

If electrostatic force
b/w charge is F
and distance is r then
F depend on r

(a) $F \propto \dfrac{1}{r^2}$ ✗

(b) $F \propto \dfrac{1}{r}$

(c) $F \propto \dfrac{1}{r^3}$

(d) $F \propto \dfrac{1}{r^0}$

(e) All of these

THANK YOU

Ans (e)